

User's Manual



Hygro Thermo-Anemometer

Model 407412



WARRANTY

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 for authorization. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

Introduction

Congratulations on your purchase of Extech's Hygro Thermo-Anemometer. This Heavy Duty meter measures and displays Air Velocity + Temperature and Relative Humidity + Temperature. Air flow can be displayed in the following units of measure: feet per minute, meters per second, miles per hour, kilometers per hour, and knots. Temperature and RH units are displayed in °C/°F and % units respectively. Careful use of this meter will provide years of reliable service.

Specifications

General Specifications

Display	Dual function, 3-1/2 digit (2000 count) LCD display
Units of measure	m/s (meters per second), km/hr (kilometers per hour), ft/min (feet per minute), knots (nautical miles per hour), mile/hr (miles per hour); Temperature: °C/°F; Humidity: %RH
Data hold	Holds reading on the LCD display when button is pressed
Sensors	Air velocity sensor: Twisted vane arm with low friction ball bearing; Temperature: Precision thermistor; Humidity: Thin film capacitor
Max/Min Record	Records highest and lowest readings for later recall
Data Output	RS-232 serial PC interface
Operating Temp.	32°F to 122°F (0°C to 50°C)
Operating Humidity	Max. 80% RH.
Power Supply	9V battery
Power Consumption	Approx. 8.3 mA DC
Weight	0.77 lbs. (350g)
Dimensions	Meter: 7.1x2.8x1.3" (180 x 72 x 32mm); Anemometer Probe: 0.7" (17mm) Diameter x 6.7" (170mm)
Accessories	Anemometer/temperature and RH Probes, 9V battery, & case

Range Specifications

Air velocity

Measurement	Range	Resolution	Accuracy
ft/min	80-4930 ft/min	1 ft/min	$\pm(2\% + 20\text{ft/min})$
m/s	0.4 - 25.0 m/s	0.1 m/s	$\pm(2\% + 2\text{digits})$
km/hr	1.4 - 90.0 km/hr	0.1 km/hr	
mile/hr	0.9-55.9 mile/hr	0.1 mile/hr	
knots	0.8 - 48.6 knots	0.1 knots	

Temperature

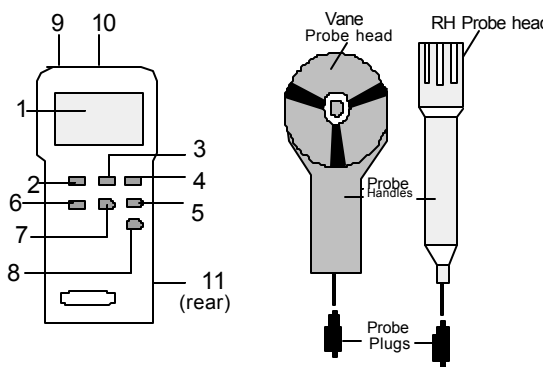
Range	Resolution	Accuracy
32°F to 122°F / 0°C to 50°C /	0.1°C/°F	$\pm 1.5^\circ\text{F} / \pm 0.8^\circ\text{C}$

Relative Humidity

Range	Resolution	Accuracy
10 to 70% RH	0.1%	$\pm 3\% \text{ RH}$
70 to 95% RH	0.1%	$\pm 4\% \text{ RH}$

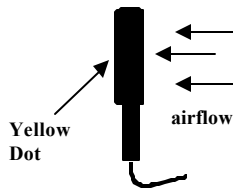
Meter Description

1. LCD Display
2. POWER button
3. Data Hold button
4. °C/°F Selection button
5. Function switch
6. Data Record button
7. Data Recall button
8. Units select button
9. RS-232 output jack
10. Probe input socket
11. Battery compartment



Anemometer and Temperature Operation

1. Insert the Vane sensor into the meter's input jack at the top of the meter.
2. Press the POWER button to turn the instrument on.
3. Select 'Anemometer' operation by placing the function slider switch to the vane icon.
4. Select the temperature units by pressing the °C/°F button. The LCD display will indicate "C" or "F" as selected.
5. Select the air velocity unit of measure by pressing the UNIT button. With each press the display scrolls through the units (m/s, km/hr, ft/min, knots, & mile/h).
6. Hold the probe by its handle and position the vane so that the yellow dot is on the exhaust side of the vane. The meter will then indicate Air Velocity + Temperature (See diagram at right).



Relative Humidity and Temperature Operation

1. Insert the Relative Humidity probe in the input jack at the top of the meter.
2. Press the POWER button to turn on the instrument.
3. Select the Humidity mode of operation by placing the function slider switch to the %RH position.
4. Select the temperature units by pressing the °C/°F button. The LCD display will indicate "C" or "F" as selected.
5. Hold the probe by the handle and point it in the area to be measured. The meter will display Relative Humidity + Temperature.
6. Note that humidity measurements take several minutes to stabilize.

Data Hold

Press the DATA HOLD button to freeze the displayed reading. The DH icon will appear on the LCD while Data Hold is engaged. Press the DATA HOLD button again to resume normal operation.

Min/Max Record Mode

When selected, the Record mode stores the highest (Max) and lowest (Min) readings for later recall. To use Record mode:

1. Press the RECORD button. The REC indicator will appear on the LCD display.
2. Start a measurement session.
3. After the measurement session, press the RECALL button to view the highest (Max) reading recorded since the RECORD button was pressed. The MAX indicator will appear to inform the user that the displayed reading is the highest value recorded.
4. Press the RECALL button again to view the lowest reading encountered since the RECORD key was pressed (the MIN indicator will appear on the LCD to inform the user that the reading displayed is the lowest value recorded).
5. Press RECORD again to return the meter to normal operation. All stored data will be cleared and the REC/MIN/MAX icons will disappear from the LCD.
6. Note that putting the meter into the Record mode defeats the Auto Power Off feature.

RS-232 PC Interface

The RS-232 serial data port (3.5mm phono jack) is located at the top of the meter next to the sensor input jack. The PC interface hardware is intended for use with the Extech Data Acquisition software package, Part Number 407001 which includes Windows™ 95 / 98 / ME / NT / 2000 compatible software and PC interface cable. For more information, contact Extech or refer to the 407001 User's Manual.

Auto Power Off feature

The Auto Power Off feature automatically turns the meter off after approximately 10 minutes. To defeat this feature, place the meter in Record mode by pressing the RECORD key once (the REC icon will appear on the LCD). The meter will remain powered as long as the meter is in the RECORD mode.

Battery Replacement

When it is time to replace the 9V battery, the low battery indicator (LBT) appears in the left hand corner of the LCD display. Note that reliable readings can be obtained for several hours after the first appearance of the low battery indicator.

To replace the battery:

1. Remove the meter's protective rubber holster.
2. Pry off the battery compartment cover on the rear of the meter using a small coin or screwdriver.
3. Replace the 9V battery and reinstall the compartment cover and holster.

Relative Humidity Calibration

1. Turn the meter on and select the Humidity mode using the slide switch.
2. Use a simulator to apply 0.0 °C to the meter and adjust VR3 for a display of 0.0 °C.
3. Change the input to 25.0 °C and adjust VR1 for a display of 25.0 °C.
4. Change the input to 50.0 °C and verify a display of 50.0 °C. Readjust VR3 & VR1 if necessary.
5. Connect the humidity probe to the unit and place the probe in a controlled 33% RH environment. Let stabilize for a minimum of 30 minutes and adjust VR5 for a reading of 33.0% RH.
6. Place the probe in a 75% RH environment for a minimum of 30 minutes and adjust VR6 for a reading of 75.0% RH.
7. Verify that the temperature reading is within the published specifications. If not, perform calibration steps 2 and 3, above, again.

Calibration and Repair Services

Extech offers complete repair and calibration services for all of the products we sell. For periodic calibration, NIST certification or repair of any Extech product, call customer service for details on services available. Extech recommends that calibration be performed on an annual basis to insure calibration integrity.

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Tech Support Hotlines

781-890-7440 ext. 200

extech@extech.com

www.extech.com

Appendix

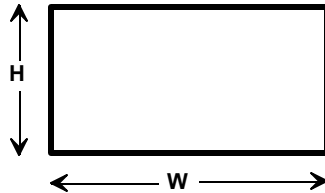
Conversion Table

to convert	to	multiply by	to convert	to	multiply by
feet/minute	cms/sec	0.508	knots	feet/hr	6,080
feet/minute	feet/sec	0.01667	knots	kilometers/hr	1.8532
feet/minute	kms/hr	0.01829	knots	nautical miles/hr	1
feet/minute	meters/min	0.3048	knots	statute miles/hr	1.151
feet/minute	miles/hr	0.01136	mph	cms/sec	44.7
meters/sec	feet/min	196.8	mph	feet/min	88
meters/sec	feet/sec	3.281	mph	feet/min	88
meters/sec	kilometers/hr	3.6	mph	feet/sec	1.467
meters/sec	kilometers/min	0.06	mph	kms/hr	1.609
meters/sec	miles/hr	2.237	mph	kms/min	0.02682
meters/sec	miles/min	0.03728	mph	knots	0.8648
kilometers/hr	cms/sec	27.78	mph	meters/min	26.82
kilometers/hr	feet/min	54.68	mph	miles/min	0.1667
kilometers/hr	feet/sec	0.9113			
kilometers/hr	knots	0.5396			
kilometers/hr	meters/min	16.67			
kilometers/h	miles/hr	0.6214			

Area Equations

Rectangular Duct

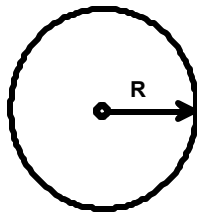
$$\text{Area} = W \times H$$



Circular Duct

$$\text{Area} = 2 \pi R^2$$

$$(A=2 \times 3.14 \times R \times R)$$



Cubic equations

$$\text{CFM (ft}^3/\text{min)} = \text{Air Velocity (ft/min)} \times \text{Area (ft}^2\text{)}$$

$$\text{CMM (m}^3/\text{min)} = \text{Air Velocity (m/sec)} \times \text{Area (m}^2\text{)} \times 60$$